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सड़क वाहन — फ्यूज-लिंक

भाग 5 एक्सिअल टर्मिनल वाले फ्यूज-लिंक (स्ट्रिप फ्यूज-लिंक) टाइप एस एफ 30 एवं एस एफ 51 एवं परीक्षण अनुलग्नी

(दूसरा पुनरीक्षण)

Indian Standard

ROAD VEHICLES — FUSE-LINKS

PART 5 FUSE-LINKS WITH AXIAL TERMINALS (STRIP FUSE-LINKS) TYPES SF 30 AND SF 51 AND TEST FIXTURES

(Second Revision)

ICS 43.040.10

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2012 **Price Group 7**

Automotive Electrical Equipments and Instruments Sectional Committee, TED 11

NATIONAL FOREWORD

This Indian Standard (Part 5) (Second Revision) which is identical with ISO 8820-5 : 2007 'Road vehicles — Fuse-links — Part 5: Fuse-links with axial terminals (Strip fuse-links) Types SF 30 and SF 51 and test fixtures' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Automotive Electrical Equipments and Instruments Sectional Committee and approval of the Transport Engineering Division Council.

This standard was first published in 1963 and revised in 1974. In this revision the standard has been thoroughly update with respect to types, test requirements and user's guide. In line with ISO, this standard has been brought out in seven parts.

This standard is one of the series of Indian Standards on fuse-links for automotive vehicles. Other parts in this series are:

Part 1	Definitions and general test requirements
Part 2	User's guide
Part 3	Fuse-links with tabs (Blade type)
Part 4	Fuse-links with female contacts (Type A) and bolt-in contacts (Type B) and their test fixtures
Part 6	Single-bolt fuse-links
Part 7	Fuse-links with tabs (Type G) with rated voltage of 450 V

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 2768-1 : 1989 General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications	IS 2102 (Part 1) : 1993 General tolerances: Part 1 Tolerances for linear and angular dimensions without individual tolerance indications	Identical
ISO 4017 : 1999 Hexagon head screws — Product grades A and B	IS 1364 (Part 2) : 2002 Hexagon head bolts and nuts of product grades A and B: Part 2 Hexagon head screw (size range M 1.6 to M 64)	do
ISO 4032 : 1999 Hexagon nuts, style 1 — Products grades A and B	IS 1364 (Part 3) : 2002 Hexagon head bolts screws and nuts of product grades A and B: Part 3 Hexagon nuts, style 1 (size M 1.6 to M 64)	do

(*Continued on third cover*)

Indian Standard

ROAD VEHICLES — FUSE-LINKS

PART 5 FUSE-LINKS WITH AXIAL TERMINALS (STRIP FUSE-LINKS) TYPES SF 30 AND SF 51 AND TEST FIXTURES

(Second Revision)

1 Scope

This part of ISO 8820 specifies fuse-links with axial terminals (Strip fuse-links) Type SF 30 and SF 51 and test fixtures for fuses in road vehicles. It establishes, for these fuse-link types, the rated current, test procedures, performance requirements and dimensions.

This part of ISO 8820 is applicable to fuse-links with a rated voltage of 32 V, a current rating of 30 A to 500 A and a breaking capacity of 2 000 A intended for use in the electrical system of road vehicles with a nominal voltage of 12 V and/or 24 V.

This part of ISO 8820 is intended to be used in conjunction with ISO 8820-1 and with ISO 8820-2. The numbering of its clauses corresponds to that of ISO 8820-1, whose requirements are applicable, except where modified by requirements particular to this part of ISO 8820.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 4017, *Hexagon head screws — Product grades A and B*

ISO 4032, *Hexagon nuts, style 1 — Product grades A and B*

ISO 6722, *Road vehicles — 60 V and 600 V single-core cables — Dimensions, test methods and requirements*

ISO 7089, *Plain washers — Normal series — Product grade A*

ISO 8820-1, *Road vehicles — Fuse-links — Definitions and general test requirements*

ISO 8820-2, *Road vehicles — Fuse-links — User's guide*

3 Terms and definitions

The requirements given in Table 1 and ISO 8820-1 shall apply.

4 Marking, labelling and colour coding

The requirements given in Table 1 and ISO 8820-1 shall apply.

Table 1 — Fuse-link colour coding

Fuse-link current rating A	Fuse-link type SF 30	Fuse-link type SF 51
30	orange	
40	green	
50	red	
60	yellow	
70	brown	
80	white	red
100	blue	yellow
125	pink	green
150	grey	orange
175	light brown (tan)	white
200	violet	blue
225		light brown (tan)
250		pink
300		grey
350		dark green
400		violet
450		gold / dark yellow
500		brown

5 Tests and requirements

5.1 General

5.1.1 General test conditions

In addition to carrying out the test procedures in accordance with ISO 8820-1, the following criteria shall apply:

- Tests shall be performed following the test sequences in Table 2.
- The test fixtures for electrical tests shall be designed in accordance with Figures 4, 5, 6 and 7. The connection resistance shall be a maximum of 1,0 mΩ for SF 30 fuse-links and 0,35 mΩ max. for SF 51 fuse-links to ensure the proper function of the test fixture.
- Terminals shall have a suitable finish which will ensure corrosion protection, and shall have satisfactory mechanical and electrical properties.

Fuse-link type SF 30 with a rated current of 150 A and 200 A and fuse-link type SF 51 with a rated current of 300 A … 500 A shall only be used for short circuit protection and have to be tested with a cable, the insulation of which will withstand the test without deterioration.

5.1.2 Test sequence

Table 2 — Test sequences

No.	Test		Clause	Sample groups [a]						
				1	2	3	4	5	6	7
1	Dimensions		6	X	X	X				
2	Marking, labelling and colour coding		4	X	X	X	X	X	X	X
3	Terminal strength		5.8	X	X	X	X	X	X	X
4	Fuse-link voltage drop		5.2	X	X	X				
5	Climatic load		5.4				X			
6	Chemical load		5.4					X		
7	Mechanical load		5.4						X	
8	Transient current cycling		5.3							X
9	Fuse-link voltage drop		5.2				X	X	X	X
10	Current step		5.6			X				
11	Breaking capacity		5.7	X						
12	Operating time rating	0,75 I_R, 1,0 I_R or 1,1 I_R	5.5		X		X	X	X	X
		1,35 I_R or 1,5 I_R			Y[b]		Y	Y	Y	Y
		2,0 I_R			Y		Y	Y	Y	Y
		3,0 I_R or 3,5 I_R			Y		Y	Y	Y	Y
		5,0 I_R or 6,0 I_R			Y		Y	Y	Y	Y
13	Terminal strength (removal)		5.8	X	X	X	X	X	X	X

[a] Each sample group shall contain a minimum of 8 fuse links.

[b] For these operating time tests noted with a Y, the sample groups 2, 4, 5, 6 and 7 for each current rating shall be divided equally. These fuses are intended to be subjected to a single operating time test only.

5.1.3 Test cable sizes

Test cable sizes shall be as given in Table 3. All tests for a particular fuse-link rating shall be performed using the same cable size.

Test cable sizes are specified to allow comparative fuse-link tests to be carried out. The cable size specified does not necessarily indicate the size of cable to be used in the vehicle application.

Table 3 — Test cable sizes

Current rating A	Conductor cross sectional area[a] mm^2	
	for fuse-link types SF 30	for fuse-link types SF 51
30	2,5	
40	4,0	
50	6,0	
60		
70	10,0	
80		10,0
100	16,0	16,0
125	25,0	
150		25,0
175		
200		35,0
225		
250		50,0
300		70,0
350		
400		
450		
500		

[a] Conductor material according ISO 6722.

5.2 Voltage drop

5.2.1 Test

The test given in ISO 8820-1 shall apply. Measure the voltage drop at the points as indicated (see Figures 4, 5 and 6), using the test fixtures of Clause 7.

This test shall be performed at 0,75 I_R for:

- SF 30 - 150 A … 200 A, and
- SF 51 - 300 A … 500 A.

5.2.2 Requirement

The requirements given in Table 4 shall apply.

Table 4 — Voltage drop

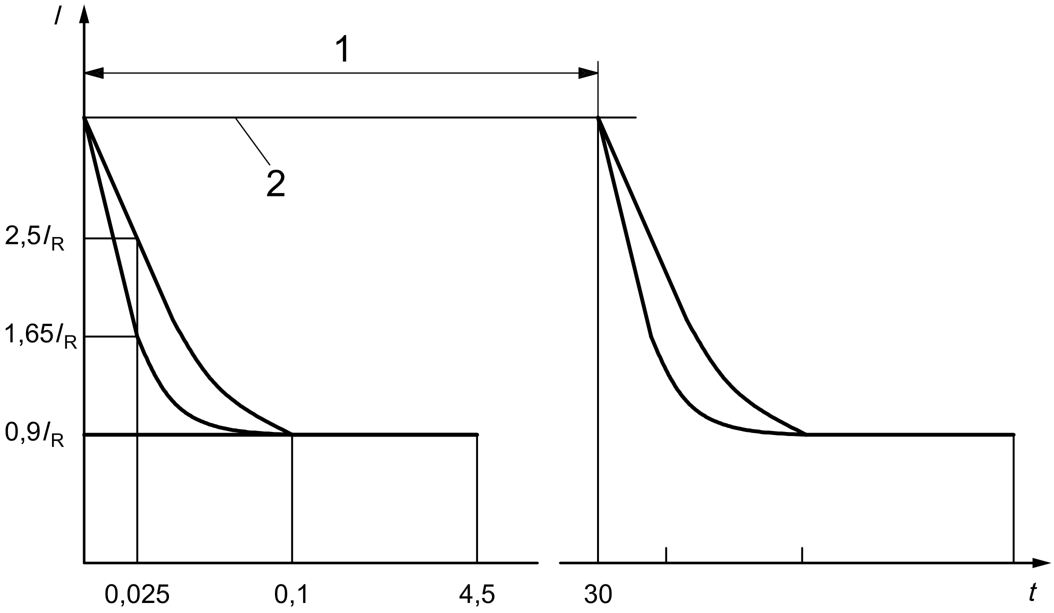
Fuse-link current rating A	Max. voltage drop mV	
	for fuse-link types SF 30	for fuse-link types SF 51
30	105	
40	90	
50	80	
60		
70		
80	75	110
100		
125		
150	70	
175		
200		
225		
250		
300		80
350		
400		
450		
500		

5.3 Transient current cycling

5.3.1 Test

Figure 1 and the test given in ISO 8820-1 shall apply. At an elapsed time of 0,025 s on-time, the current shall fall to a value between 1,65 I_R and 2,5 I_R. At no time shall the steady state current fall below 0,9 I_R.

This test does not apply to fuse-links type SF 30 current ratings of 150 A and above, and type SF 51 current ratings of 300 A and above. For those fuse-links, agreements shall be taken between manufacturer and supplier.



Key

1 one cycle
2 4 I_R
I current
t time in s

Figure 1 — Transient current cycling

5.3.2 Requirement

The requirements given in ISO 8820-1 shall apply.

5.4 Environmental conditions

The tests and requirements given in ISO 8820-1 shall apply.

5.5 Operating time rating

5.5.1 Test

The test given in ISO 8820-1 shall apply.

5.5.2 Requirements

The requirements given in Table 5 shall apply.

After activation, the current through the fuse-link shall not exceed 0,5 mA at the rated voltage of the fuse-link.

Table 5 — Operating times

Test currents	Operating times s							
	SF 30				SF 51			
	30 A …125 A		150 A ... 200 A		80 A ... 250 A		300 A ... 500 A	
	min.	max.	min.	max.	min.	max.	min.	max.
0,75 I_R	—[b]	—	360 000	∞	—	—	14 400	∞
I_R	360 000	∞	—	—	14 400	∞	—	—
1,1 I_R	14 400	∞	—	—	—	—	—	—
1,35 I_R	—	—	—	—	120	1 800	—	—
1,5 I_R	90	3 600	—	—	—	—	—	—
2,0 I_R	3	100	1	15	1	15	1	15
3,0 I_R	0,3	3	—	—	—	—	—	—
3,5 I_R	—	—	0,3	5	0,3	5	0,5	5
5,0 I_R	0,1	1	—	—	—	—	—	—
6,0 I_R [a]	—	—	0,1	1	0,1	1	0,1	1

[a] Not for ⩾ 350 A.

[b] Not specified, where noted with “—”.

5.6 Current steps

5.6.1 Test

The test given in ISO 8820-1 shall apply.

NOTE This test does not apply for fuse types SF 30 – 150 A to 200 A … SF 51 – 300 A … 500 A.

5.6.2 Requirements

The requirement given in ISO 8820-1 shall apply. After activation, the current through the fuse-link shall not exceed 0,5 mA at the rated voltage of the fuse-link.

5.7 Breaking capacity

5.7.1 Test

The test given in ISO 8820-1 shall apply.

Test at 2 000 A with cable sizes as shown in Table 3.

5.7.2 Requirement

The requirement given in ISO 8820-1 shall apply. After the test, the current through the fuse-link shall not exceed 0,5 mA at the rated voltage of the fuse-link.

5.8 Strength of terminals

5.8.1 Test

Install the fuse-links in the test fixture (see Figures 4, 5 and 6) with the mounting torque according to Table 6. This test is performed without cables and terminals.

Table 6 — Mounting torque

Fuse-link type	Mounting torque Nm
SF 30 – for M5 bolts	4,5 ± 1
SF 30 – for M6 bolts	6 ± 1
SF 51 – for M8 bolts	12 ± 1

For mounting in the vehicle, the specific procedure (greasing, surface materials, surface roughness, etc.) shall be agreed upon between the fuse-manufacturer, the fuse-box manufacturer and the vehicle manufacturer.

NOTE Test number 13 in Table 2 “test sequence” is just a removal from the test fixture.

5.8.2 Requirement

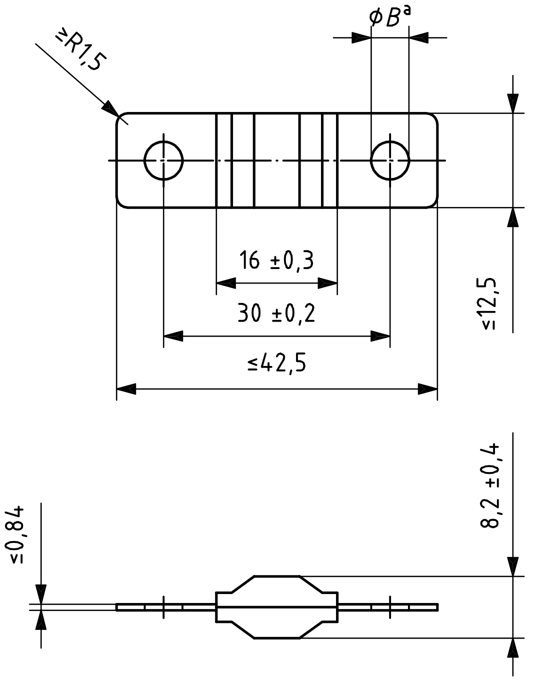
Fuse-links shall remain physically intact.

6 Dimensions and designation examples

6.1 Type SF 30

6.1.1 Dimensions

Dimensions in millimetres



[a] For fuse links with rated current ⩽ 125 A the hole, B, is for a bolt diameter of M5 and/or M6, and for fuse-links with a rated current > 125 A the hole B is for a bolt diameter of M6.

Figure 2 — Fuse-link type SF 30

6.1.2 Designation example

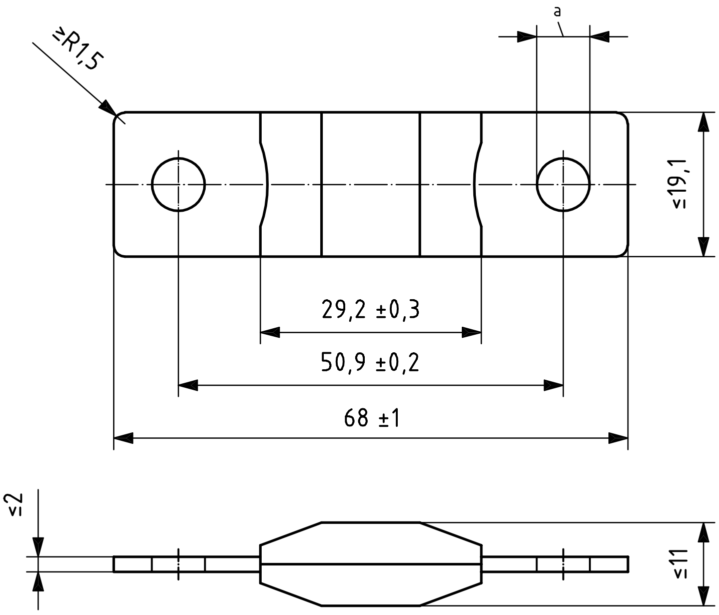
An example of the designation of a fuse-link, type SF 30 for a rated current of 100 A and M6 bolt is:

Fuse ISO 8820 – SF 30-100 – M6

6.2 Type SF 51

6.2.1 Dimensions

Dimensions in millimetres



[a] Bolt M8.

Figure 3 — Fuse-link type SF 51

6.2.2 Designation example

An example of the designation of a fuse-link, type SF 51 for a rated current of 150 A is:

Fuse ISO 8820 – SF 51-150

7 Test fixture

7.1 General

This clause establishes the overall dimensions, materials, finish and coatings for the test fixture to perform electrical tests on fuse-links as specified herein.

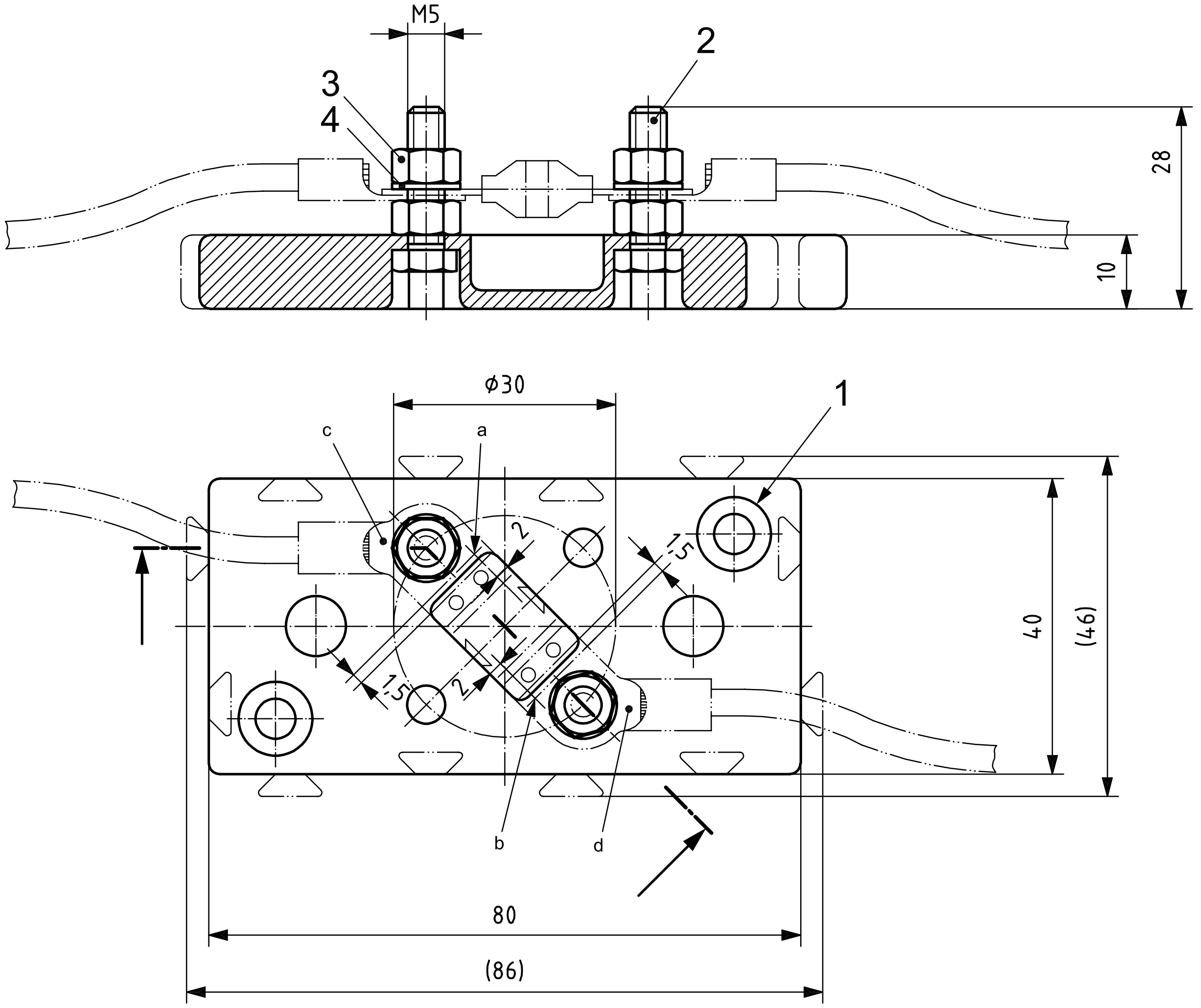
7.2 Materials and dimensions

The test fixture shall conform to the material requirements and dimensions shown in Tables 7, 8 and 9 and Figures 4, 5, 6 and 7. Alternative designs of test fixtures are allowed in the case that the electrical and mechanical properties are equivalent.

Table 7 — Parts list and material specifications for M5 bolts

Reference No. in Figure 4	Description	Dimensions see Figure	Material specifications, finish and coating	Quantity
1	Test fixture insulating body	7	Thermoset plastic	1
2	Bolt: ISO 4017-M5×20-8.8	—	Steel, gal. Zn	2
3	Nut: ISO 4032-M5-8	—	Steel, gal. Zn	4
4	Washer: ISO 7089-5-200 HV	—	Steel, gal. Zn	2

Dimensions in millimetres
Tolerances in accordance with ISO 2768



Key

1 Test fixture insulating body
2 Bolt: ISO 4017-M5×20-8.8
3 Nut: ISO 4032-M5-8
4 Washer: ISO 7089-5-200 HV

NOTE 1 Points a and b are the measuring points for the voltage drop.

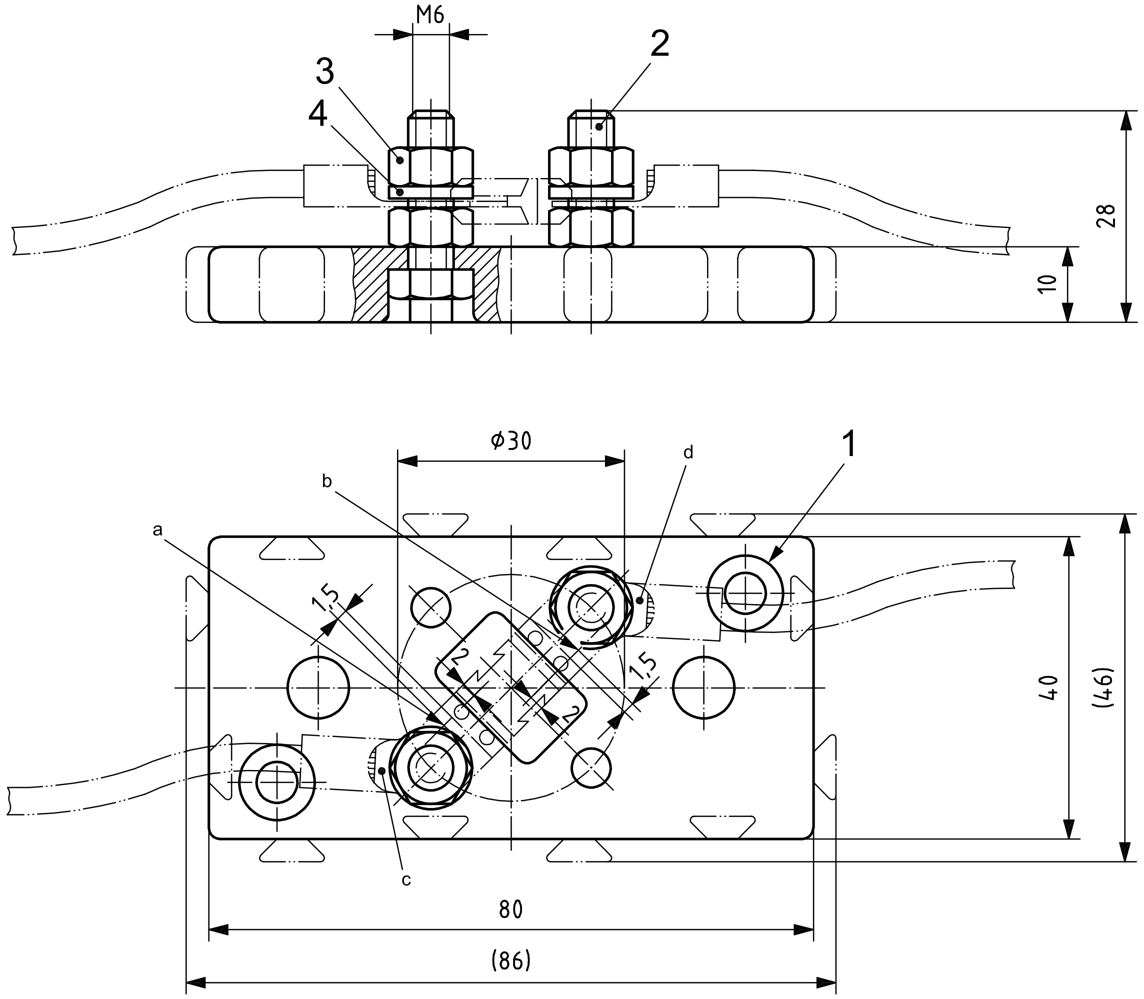
NOTE 2 Points a, b, c and d are the measuring points for connection resistance.

Figure 4 — Test fixture with M5 bolts for type SF 30 fuse-links

Table 8 — Parts list and material specifications with M6 bolts

Reference No. in Figure 5	Description	Dimensions see Figure	Material specifications, finish and coating	Quantity
1	Test fixture insulating body	7	Thermoset plastic	1
2	Bolt: ISO 4017-M6×20-8.8	—	Steel, gal. Zn	2
3	Nut: ISO 4032-M6-8	—	Steel, gal. Zn	4
4	Washer: ISO 7089-5-200 HV	—	Steel, gal. Zn	2

Dimensions in millimetres
Tolerances in accordance with ISO 2768



Key

1 Test fixture insulating body
2 Bolt: ISO 4017-M6×20-8.8
3 Nut: ISO 4032-M6-8
4 Washer: ISO 7089-5-200 HV

NOTE 1 Points a and b are the measuring points for the voltage drop.

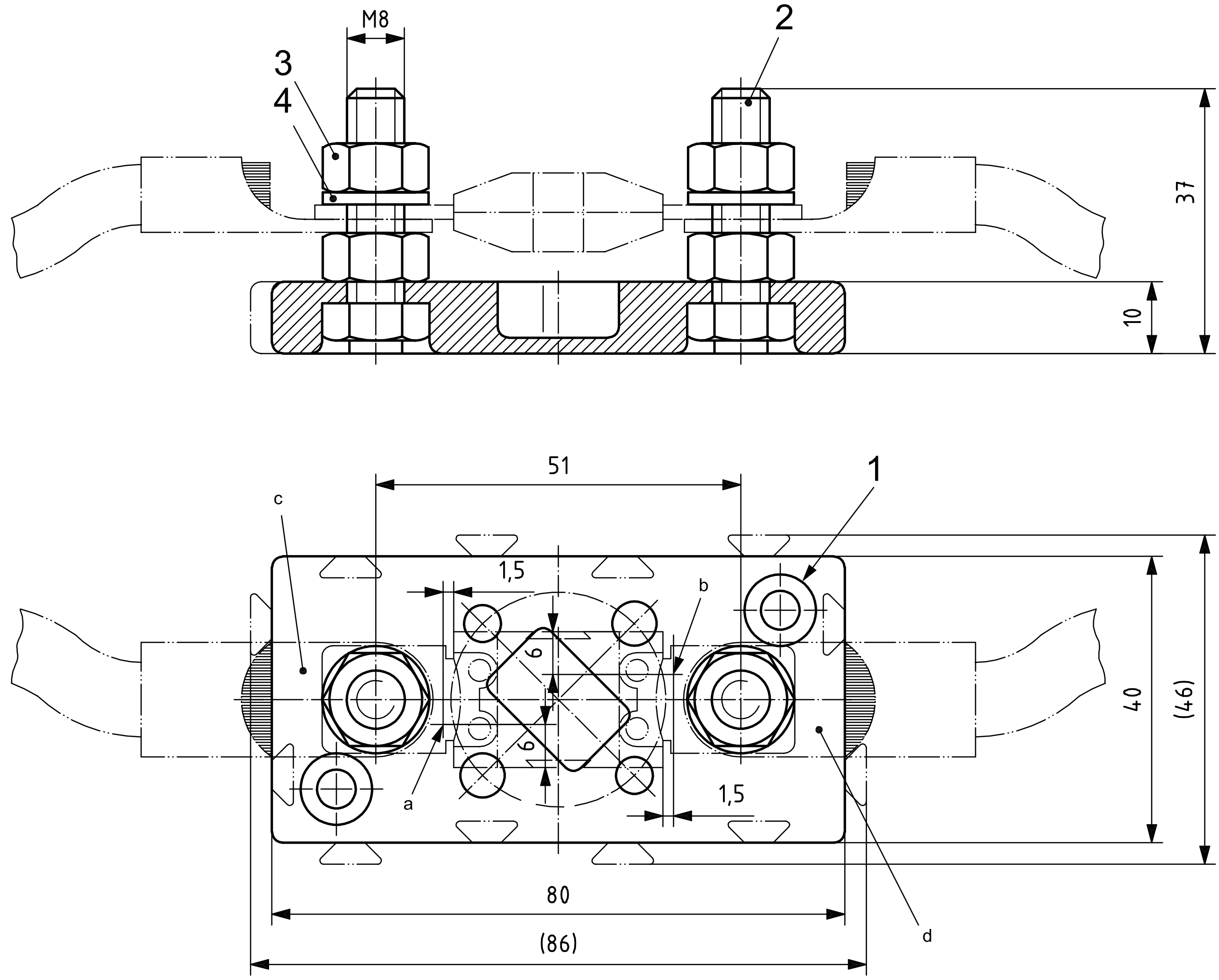
NOTE 2 Points a, b, c and d are the measuring points for connection resistance.

Figure 5 — Test fixture with M6 bolts for type SF 30 fuse-links

Table 9 — Parts list and material specifications with M8 bolts

Reference No. in Figure 6	Description	Dimensions see figure	Material specifications, finish and coating	Quantity
1	Test fixture insulating body	7	Thermoset plastic	1
2	Bolt: ISO 4017-M8×30-8.8	—	Steel, gal. Zn	2
3	Nut: ISO 4032-M8-8	—	Steel, gal. Zn	4
4	Washer: ISO 7089-5-200 HV	—	Steel, gal. Zn	2

Dimensions in millimetres
Tolerances in accordance with ISO 2768



Key

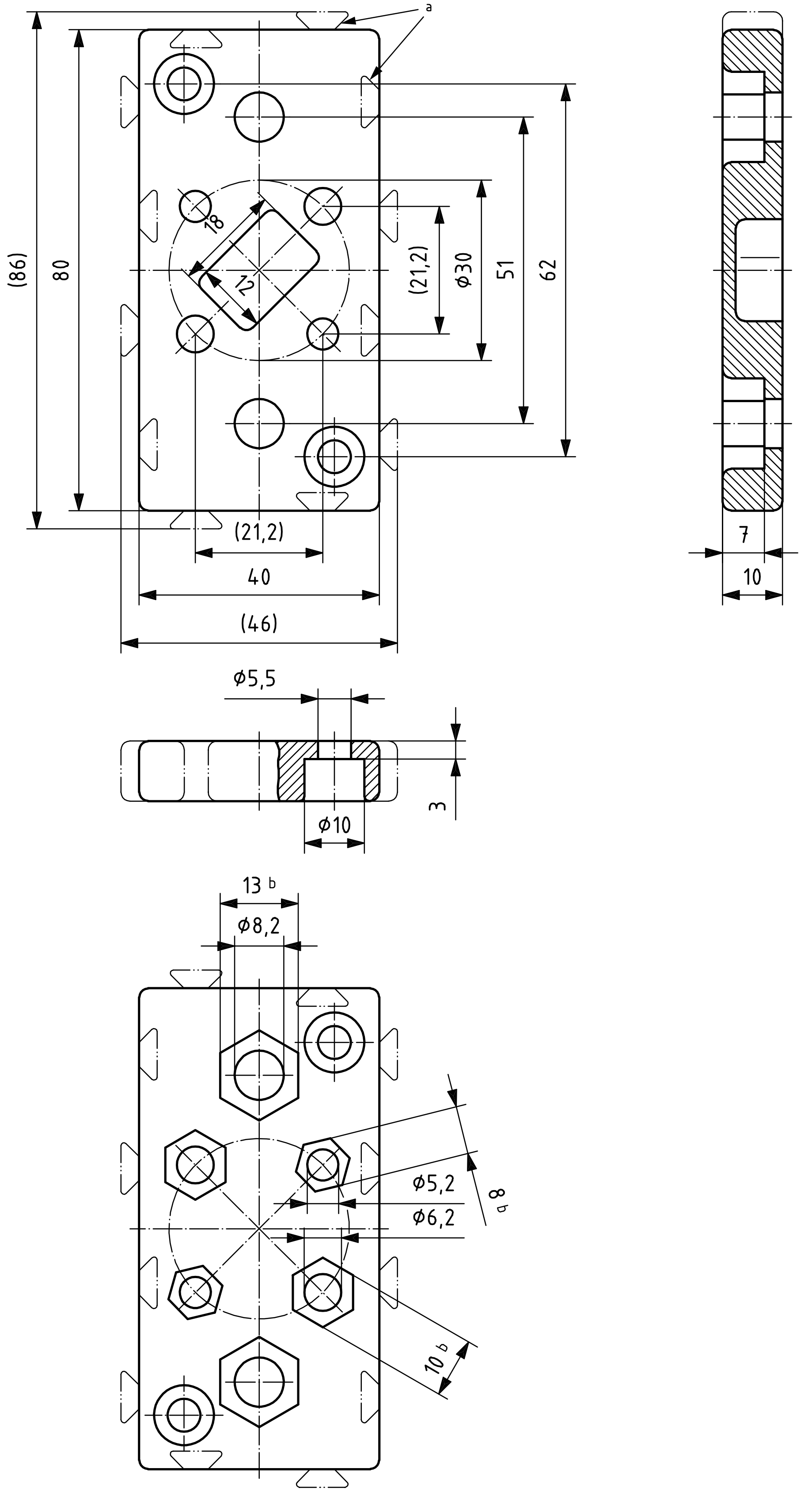
1 Test fixture insulating body
2 Bolt: ISO 4017-M8×30-8.8
3 Nut: ISO 4032-M8-8
4 Washer: ISO 7089-5-200 HV

NOTE 1 Points a and b are the measuring points for the voltage drop.

NOTE 2 Points a, b, c and d are the measuring points for connection resistance.

Figure 6 — Test fixture with M8 bolts for type SF 51 fuse-links

Dimensions in millimetres
Tolerances in accordance with ISO 2768
All corners, edges are rounded R1



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[a] Optionally dovetailing.

[b] Width across flats.

Figure 7 — Test fixture insulating body

NATIONAL ANNEX A

(*National Foreword*)

A-1 BIS CERTIFICATION MARKING

The product may also be marked with the Standard Mark.

A-1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards* Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 6722 : 2006 Road vehicles — 60 V and 600 V single-core cables — Dimensions, test methods and requirements	IS/ISO 6722 : 2006 Road vehicles — 60 V and 600 V single-core cables — Dimensions, test methods and requirements	Identical
ISO 8820-1 : 2008 Road vehicles — Fuse-links — Definitions and general test requirements	IS 2577 (Part 1) : 2012 Road vehicles — Fuse-links: Part 1 Definitions and general test requirements (*second revision*)	do
ISO 8820-2 : 2005 Road vehicles — Fuse-links — User's guide	IS 2577 (Part 2) : 2012 Road vehicles Fuse-links: Part 2 User's guide (*second revision*)	do

The technical committee has reviewed the provision of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 7089 : 2000	Plain washers — Normal series — Product grade A

In order to protect the automobile electrical equipments against excessive currents, fuse-links are inserted. Owing to number of circuits and accessories, it might become necessary to insert fuse-links into each circuit depending on the load requirements. This standard is intended to cover such fuse-links for automobiles.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. BIS shall not be held responsible for identifying any or all such patent rights.

This standard also makes a reference to the BIS Certification Marking of the product. Details of which are given in National Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: TED 11 (752).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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Published by BIS, New Delhi